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Prevalence and haematological parameters for bovine viral diarrhoea (BVD) in south Bengal areas in Bangladesh

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Abstract

A total of 94 blood samples were collected from commercial dairy farms, from 6 Upazillas of Barisal division. The prevalence of Bovine Viral Diarrhoea Virus (BVDV) in south Bengal areas was 51.1%, the maximum prevalence was in Ujirpur Upazilla (Sub-district; 100%) and the lowest in Pirojpur Upazilla (13.6%). There was significant ($P<0.05$) variation in the prevalence between farms. Prevalence was highest (61.3%) in animals between 3 and 5 years of age, and lowest (31.8%) in 0-1 year-old animals. Animals with low body condition score (BCS-2) had higher (63.6%) prevalence in comparison to animals of high BCS-3.5. Haemoglobin (Hb) was 8.7 ± 0.1 gm% compared to 8.6 ± 0.1 gm%. Lymphocyte count was significantly ($P<0.05$) higher (64.1 ± 0.3%) in BVD-positive animals than negative animals (41.8 ± 1.2%). The neutrophil count was significantly ($P<0.05$) higher in BVD-positive animals (22.1 ± 0.5%) compared to negative animals (16.9 ± 0.5%). Other haematological parameters were not significantly different. (*Bangl. vet*. 2015. Vol. 32, No. 2, 48 – 54)

Introduction

Bovine viral diarrhoea virus (BVDV) belongs to the family Flaviviridae and the genus Pestivirus (ICTV, 2011). The virus is classified into non-cytopathogenic (ncp) and cytopathogenic (cp) based on the effects it produces on the bovine cell culture . On the basis of antigenic and genetic features, BVDV is classified into two species- BVDV-1 and BVDV-2. BVDV-1 is dominant in North America and BVDV-2 in Europe, where it comprises above 90% of cases (Lindberg *et al.,* 2006). Disease occurs significantly with BVDV-1 although outcomes have been mainly described after infection with BVDV-2. It causes poor reproductive performance in cows and mucosal disease in calves (Mishra *et al.,* 2009). The characteristic clinical signs are leucopenia, transient fever, diarrhoea, abortion, respiratory distress, reproductive failure and congenital defects in calves (Lucero *et al.,* 2006), lameness, early embryonic death and immune suppression (Rubaye and Hasso, 2012), mummification, stillbirth, neural defects and calving of persistently infected calves (Ahmad *et al.,* 2011). In Bangladesh, very few records are available on the prevalence of the disease in dairy herds (Samad, 1999;

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Haider *et al.,* 2013). The present study was carried out to determine the prevalence of BVDV and haematological changes in the commercial dairy herds in Barisal division.

Materials and Methods

The study was carried out in the Department of Physiology and Pharmacology, Patuakhali Science and Technology University and Field Disease Investigation Laboratory (FDIL), Barisal Head Quarter (Sadar) from July 2013 to April 2014.

Sample size and diagnosis of the disease

A total of 94 blood samples were collected from commercial dairy farms, from 6 Upazillas of Barisal division. Prevalence of BVD was confirmed on the basis of clinical history and the laboratory analysis of blood samples. Blood samples (2 mL each) were collected through jugular veni puncture using 5 mL disposable plastic syringe with 19G needle from adult and young non-vaccinated healthy and persistent diarrhoeal cattle (Archambault *et al.,* 2000; Hamers *et al.,* 2000; Stoffregen *et al.,* 2000; Liebler-Tenorio *et al.,* 2002).

After collection, blood sample was taken into a cryovial containing anticoagulant (EDTA 0.2%; Merck, Germany) for further use.

Haematology

EDTA-mixed blood (2 mL) was used to determine total erythrocyte count (TEC), haemoglobin (Hb), packed cell volume (PCV), total leukocyte count (TLC) as described by Jain (1986). Differential leukocyte counts were estimated using Wright-stained blood smears (Jain, 1986).

Statistical analysis

Differential leukocyte Count (DLC) was analysed in control and affected animals using SPSS version 18.0 for windows (Statistical Package for the Social Sciences, SPSS Inc., Chicago, IL, USA) and graphs were prepared using Sigma Plot 10. Student T-test was performed to compare TEC, TLC, PCV, haemoglobin, and the Pearson Chi-square test was used to detect the BVDV in dairy farms, types of animals, age groups, BCS and diarrhoeic and non-diarrhoeic animals. A p value of ≤ 0.05 was considered statistically significant.

Results and Discussion

The prevalence of BVDV in the Barisal Division was 51.1% (Table 1: the highest prevalence was in Ujirpur Upazilla (100%) and the lowest in Pirojpur Upazilla (13.6%). However, the number of the samples in Ujirpur (3) was low. Larger sample size may show different results). Similar observation was recorded in north Italy (Luzzago *et al.,* 1999). In Turkey a higher prevalence (60%) was observed (Gelfert,

1991; Sudharshana *et al.,* 1999) and about 15.3% in India, which is similar to the lowest value in the present study (13.6%).

Table 1. Prevalence of BVDV in the different Upazillas of Barisal division

SL. No.	Name of Upazillas	No. of Cases	Positive
1	Sadar (Head Quarter)	17	5 (29.4%)
2	Rahmatpur	8	5 (62.5%)
3	Babuganj	15	8 (53.3%)
4	Ujirpur	3	3 (100%)
5	Sharupkathi	29	24 (82.8%)
6	Pirojpur	22	3 (13.6%)
	Total	94	48 (51.1%)

Table 2. Prevalence of BVDV in different types of animals: Percentage of diarrhoeic and non-diarrhoeic animals positive for BVDV

SL. No.	**Types of** animals	**No. of observations**	**Positive**
1	Diarrhoeic	41	18 (43.9%)
2	Non-diarrhoeic	53	30 (56.6%)

Case record of BVDV within the different age groups

Prevalence of BVDV was highest in animals 3-5 years of age (61.3%). Prevalence in calves was low (31.8%: Table 3). The differences were not significant.

Table 3: Prevalence of BVDV in various age groups of animals

SL No.	Age of Animals (Year)	No. of cases	Positive
1	0-1	22	7 (31.8%)
2	>1-3	21	10 (47.6%)
3	>3-5	31	19 (61.3%)
4	>5	20	12 (60.0%)

Prevalence of BVDV in dairy farms at different zones of Barisal

In north zone, a total of 29 samples were collected from one farm, of which 24 (82.8%) were positive, the highest. In south zone, 54 samples from three different farms were tested, of which 16 (29.6%) (Table 4) were positive, the lowest. The differences between these zones were significant ($P \leq 0.05$).

BVDV was highest (63.6%) in animals with BCS-2 and lowest (38.5%) in animals with BCS-3.5 (Table 5). The differences were not significant.

Table 4. Regional prevalence of bovine viral diarrhoea virus seropositive cows

SL. No.	Zones	No. of cases	Positive
1	South	54	16 (29.6%)
2	Central	11	8 (72.7%)
3	North	29	24 (82.8%)

Distribution of BVDV among animals of different Body Condition Score (BCS)

Table 5. BCS and prevalence of BVDV in cattle

SL. No.	BCS	No. of cases	Positive
1	2	22	14 (63.6%)
2	2.5	12	6 (50.0%)
3	3	47	23 (48.9%)
4	3.5	13	5 (38.5%)

Comparison of different haematological parameters between BVDV positive and negative animals.

None of the haematological values showed significant variation (Table 6). In case of BVDV positive animals, total erythrocyte count (TEC) was 6.2 ± 0.1, whereas in BVDV negative animals the value was 6.3 ± 0.1 (× 10^6/cu mm). Total leukocyte count (TLC) value of BVDV positive and negative animals were 8.6 ± 0.4 and 9.2 ± 0.4 (× 10^3/cu mm), respectively. The packed cell volume (PCV) was (28.5 ± 0.6) and (27.9 ± 0.7)%, respectively. Haemoglobin (Hb) percentage was 8.7 ± 0.1 and 8.6 ± 0.1% in case of BVDV positive and negative animals, respectively.

Table 6. Haematological values in BVDV positive and negative animals

Variables	Diagnosis	Mean ± SE
TEC (× 10^6/cu mm)	BVDV Positive	6.2 ± 0.1
	BVDV Negative	6.3 ± 0.1
TLC (× 10^3/cu mm)	BVDV Positive	8.6 ± 0.4
	BVDV Negative	9.2 ± 0.4
PCV (%)	BVDV Positive	28.5 ± 0.6
	BVDV Negative	27.9 ± 0.7
Hb (g/dL)	BVDV Positive	8.7 ± 0.1
	BVDV Negative	8.6 ± 0.1

Differential leukocyte count (DLC) in BVDV positive and negative animals

In case of DLC, the only significant difference was in basophils. Lymphocyte count was 64.1 ± 0.3% in BVD-positive and 41.8 ± 1.2%, in BVD-negative animals. Monocyte

count was 5.6 ± 0.1% in BVD-positive and 4.9 ± 0.1% in BVD-negative animals. In BVD-positive animals the neutrophil count was 22.1 ± 0.5%, 16.9 ± 0.5% in BVD-negative animals. Eosinophil count was 9.7 ± 0.1% in BVD-positive and 8.9 ± 0.1%, in BVD-negative animals. The basophil count was 0.6 ± 0.0% in BVD-positive and 1.3 ± 0.0% in BVD-negative animals (Table 7).

Table 7. Distribution of leukocytes in BVD-positive and negative animals

Variables	Diagnosis	Mean ± SE
Lymphocyte (%)	BVD Positive	64.1 ± 0.3**
	BVD Negative	41.8 ± 1.2
Monocyte (%)	BVD Positive	5.6 ± 0.1
	BVD Negative	4.9 ± 0.1
Neutrophil (%)	BVD Positive	22.1 ± 0.5 **
	BVD Negative	16.9 ± 0.5
Eosinophil (%)	BVDV Positive	9.7 ± 0.1
	BVDV Negative	8.9 ± 0.1
Basophil (%)	BDDV Positive	0.6 ± 0.0
	BVDV Negative	1.3 ± 0.0 **

**Statistically significant

The haemoglobin concentration was 8.7 ± 0.1 in BVD-positive, and 8.6 ± 0.1g/dL in BVD-negative animals, opposite to results described in Iraq (Alsaad *et al.,* 2012). The variation between these results may be due to the age difference. In Iraq the study was performed in calves, but in the present study most of the cattle were above two years old and haemoglobin decreases with age. Ruginosu *et al. (*2010) mentioned 9.2 ± 0.3g/dL haemoglobin in cows with genital infection, which reflects decreased values due to infection. Those results showed similar trend with history of abortion and retained placenta.

Lymphocyte counts were higher than the studies in Iran, where lymphocyte count was 60.8 ± 2.5 in BVD-positive, and 47.5 ± 3.6% in BVD-negative animals. In both studies, cows positive to BVD showed more lymphocytes than the negative animals. Monocyte counts were also higher than the results of 4.8 ± 2.2 in BVD-positive and 4.5 ± 1.1% were detected in BVD-negative animals, in Iraqi cattle (Alsaad *et al.,* 2012). The value in cattle with genital infection was 1.7 ± 0.2%, lower than these results (Ruginosu *et al.,* 2010).

Neutrophil counts were lower than the study by Alsaad *et al.* (2012) and Ruginosu *et al.* (2010). Breed and stage of infection may be the cause of such variation. On the other hand, eosinophil count was higher than the other study at 9.7 ± 0.1%. Basophil

count was lower in BVD-positive cows, whereas Alsaad *et al.* (2012) found the reverse pattern.

Conclusions

The overall sero-prevalence of BVD in Barisal division was 51.1%. The highest prevalence was 82.8% in northern zone and lowest (29.6%) in southern zone. Animals aged 3-5 years had higher prevalence than calves. Packed cell volume was higher in BVD-positive animals. Haemoglobin percentage was lower in BVD-negative animals. Further study is needed to investigate the disease in the study areas. It may be concluded that these data will provide valuable diagnostic indices for the cattle industry as well as for future research, which may help to control the disease.

Conflict of interest statement

The authors have no competing interests.

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